STPS1L20MF

Low drop power Schottky rectifier in flat package

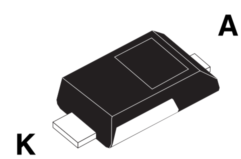
Features

- Very low profile package: 0.85 mm
- Backward compatible with standard STmite footprint
- Very small conduction losses
- Negligible switching losses
- Extremely fast switching
- Low forward voltage drop for higher efficiency and extended battery life
- Low thermal resistance
- Avalanche capability specified

Description

Single Schottky rectifier suited for switch mode power supplies and high frequency dc to dc converters.

Packaged in STmite flat, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications. Due to the very small size of the package this device fits battery powered equipment (cellular, notebook, PDA's, printers) as well as chargers and PCMCIA cards.



STmite flat
(DO222-AA)

Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	1 A
V_{RRM}	20 V
T_j (max)	150 °C
V_F (max)	0.37 V

1 Characteristics

Table 2. Absolute ratings (limiting values)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		20	V
$I_{F(RMS)}$	Forward current rms		2	A
$I_{F(AV)}$	Average forward current	T_c = 140 °C δ = 0.5	1	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal	50	A
P_{ARM}	Repetitive peak avalanche power	t_p = 1 µs T_j = 25 °C	1400	W
T_{stg}	Storage temperature range		- 65 to + 150	°C
T_j	Maximum operating junction temperature(1)		150	°C
dV/dt	Critical rate of rise of reverse voltage (rated V_R, T_j = 25 °C)		10000	V/µs

1. $\frac{dPtot}{dTj} < \frac{1}{Rth(j-a)}$ condition to avoid thermal runaway for a diode on its own heatsink

Table 3. Thermal resistance

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction to case	20	°C/W
$R_{th(j-a)}$(1)	Junction to ambient	250	°C/W

1. Mounted with minimum recommended pad size, PC board FR4

Table 4. Static electrical characteristics

Symbol	Parameter	Tests conditions		Min.	Typ.	Max.	Unit
I_R (1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$		0.015	0.075	mA
		T_j = 85 °C			0.90	4.50	
		T_j = 25 °C	V_R = 10 V		0.005	0.035	
		T_j = 85 °C			0.45	2.50	
		T_j = 25 °C	V_R = 5 V		0.003	0.025	
		T_j = 85 °C			0.30	1.60	
V_F (1)	Forward voltage drop	T_j = 25 °C	I_F = 1 A		0.38	0.43	V
		T_j = 85 °C			0.32	0.37	
		T_j = 25 °C	I_F = 2 A		0.42	0.47	
		T_j = 85 °C			0.37	0.42	
		T_j = 25 °C	I_F = 3 A		0.46	0.53	
		T_j = 85 °C			0.42	0.49	
		T_j = 25 °C	I_F = 4 A		0.50	0.60	
		T_j = 85 °C			0.46	0.56	

1. Pulse test: = 380 µs, δ < 2%

To evaluate the conduction losses use the following equation:
$P = 0.32 \times I_{F(AV)} + 0.05\, I_F{}^2{}_{(RMS)}$

Figure 1. Conduction losses versus average current

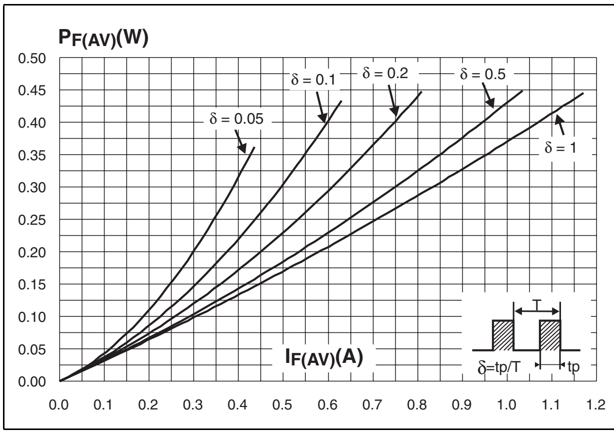


Figure 2. Average forward current versus ambient temperature (δ = 0.5)

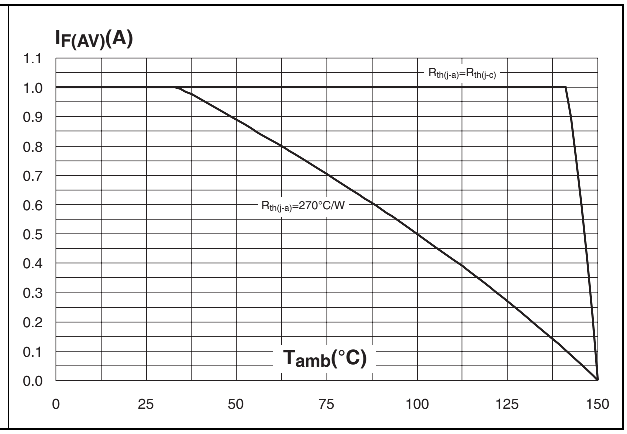


Figure 3. Normalized avalanche power derating versus pulse duration

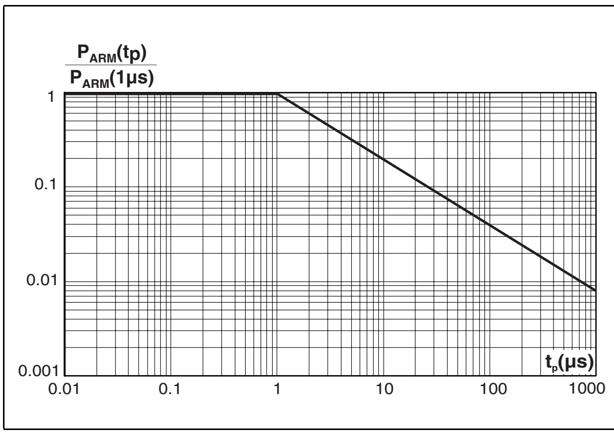


Figure 4. Normalized avalanche power derating versus junction temperature

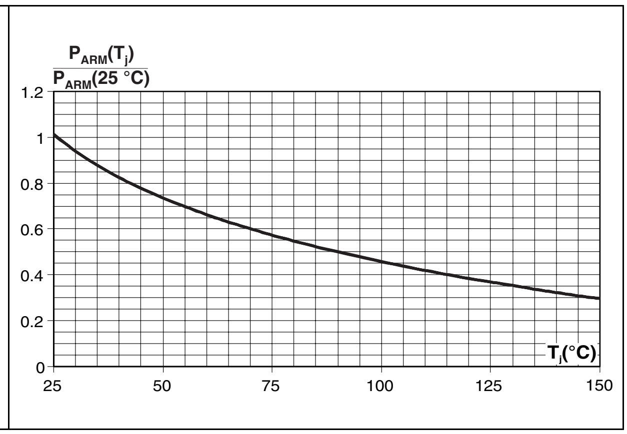


Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values)

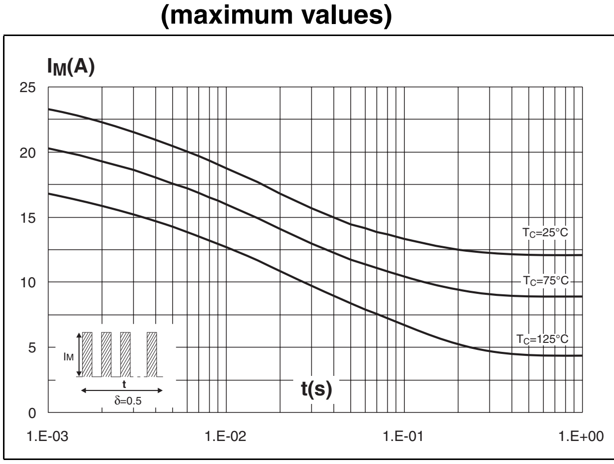


Figure 6. Relative variation of thermal impedance junction to case versus pulse duration

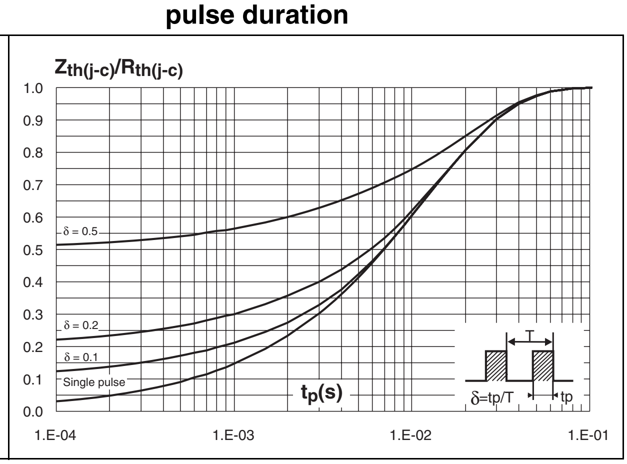


Figure 7. Reverse leakage currrent versus reverse voltage applied (typical values)

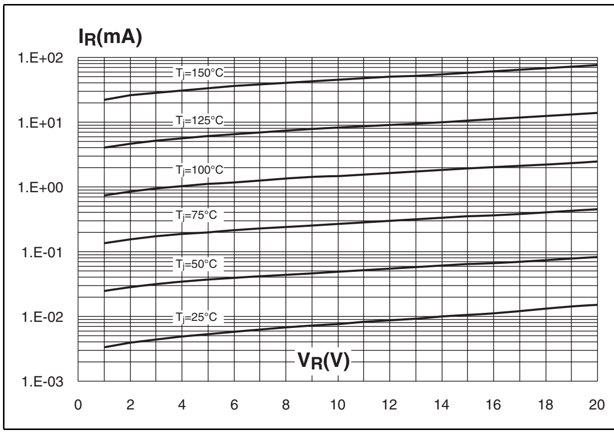


Figure 8. Reverse leakage currrent versus junction temperature (typical values)

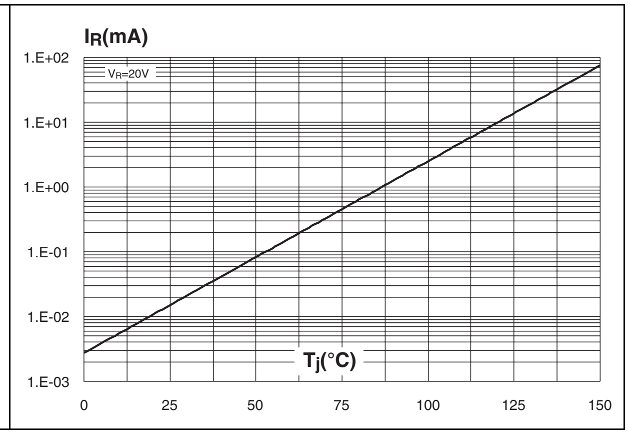


Figure 9. Junction capacitance versus reverse voltage applied (typical values)

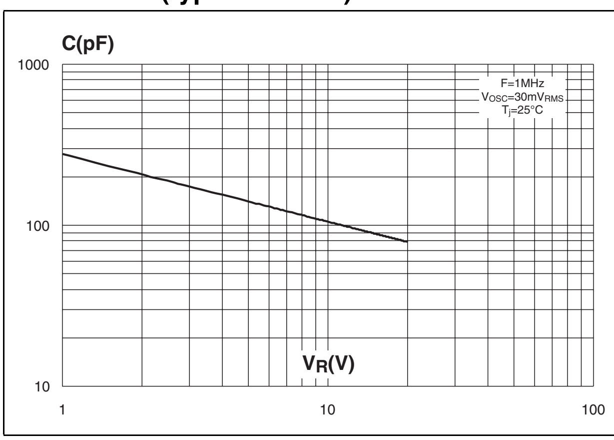


Figure 10. Forward voltage drop versus forward current

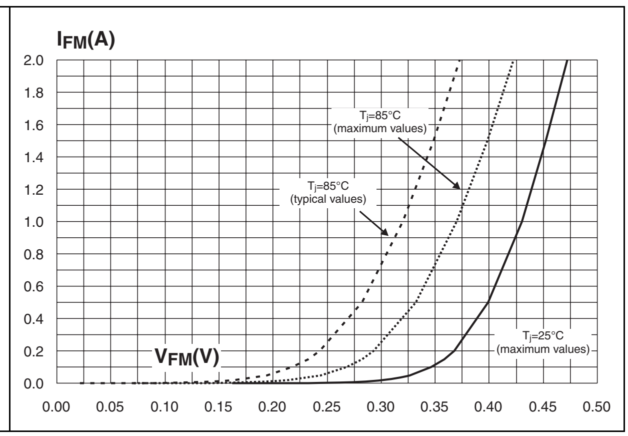
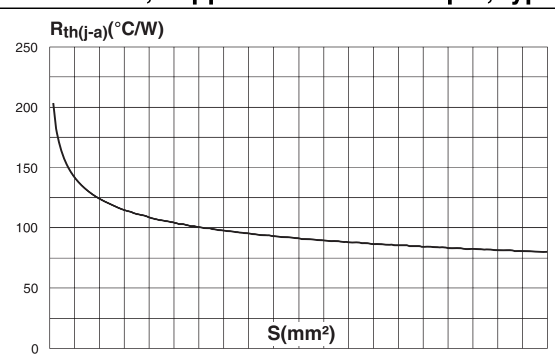


Figure 11. Thermal resistance junction to ambient versus copper surface under tab (epoxy printed board FR4, copper thickness = 35 µm, typical values)

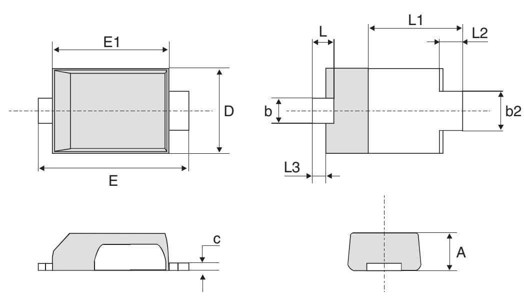


2 Package information

- Epoxy meets UL94, V0
- Lead-free packages

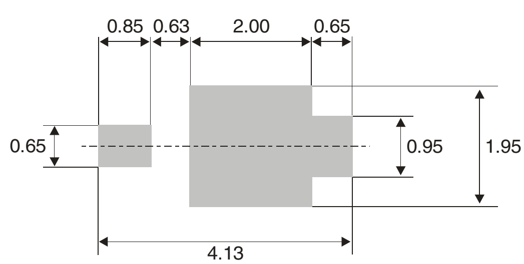
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

Table 5. STmite flat dimensions



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.80	0.85	0.95	0.031	0.033	0.037
b	0.40	0.55	0.65	0.016	0.022	0.026
b2	0.70	0.85	1.00	0.027	0.033	0.039
c	0.10	0.15	0.25	0.004	0.006	0.009
D	1.75	1.90	2.05	0.069	0.075	0.081
E	3.60	3.80	3.90	0.142	0.150	0.154
E1	2.80	2.95	3.10	0.110	0.116	0.122
L	0.50	0.55	0.80	0.020	0.022	0.031
L1	2.10	2.40	2.60	0.083	0.094	0.102
L2	0.45	0.60	0.75	0.018	0.024	0.030
L3	0.20	0.35	0.50	0.008	0.014	0.020

Figure 12. STmite flat recommended footprint (all dimensions in mm)



3 Ordering information

Table 6. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS1L20MF	F1L2	STmite flat	16 mg	12000	Tape and reel

4 Revision history

Table 7. Document revision history

Date	Revision	Changes
21-Aug-2006	1	First issue.
07-Jul-2011	2	Reformatted to current standards. Updated caption for *Figure 6*.

Please Read Carefully: